

REMARKS

The present invention is a balanced antenna for connecting to a balanced power amplifier stage in a portable communications device, a portable communications device and a method of manufacturing a balanced antenna for connecting to a balanced power amplifier stage in a portable communications device. In accordance with an embodiment of the invention, a balanced antenna 7 is provided for connecting to a balanced power amplifier 17 in a portable communications device with the balanced power amplifier including first and second outputs. The antenna comprises a ground plane 24 and first and second antenna elements 20 and 21 spaced apart from the ground plane. The first antenna element has a face lying in a first antenna plane, the second antenna element has a face lying in a second antenna plane and the first and second antenna planes are substantially parallel and are spaced apart from each other in a direction perpendicular to one of the first and second antenna planes as may be seen with the embodiments illustrated in Figs. 4, 5, 10 and 12 and 13. Each of the antenna elements has a feed point 25 which is connectable to a different one of the outputs from the power amplifier stage.

The present invention provides a balanced amplifier which does not require connection to a balanced power amplifier through a conversion network. The connection between the power amplifier and the antenna of the present invention is a direct connection not requiring an impedance matching network. See the last paragraph on page 1 and the top paragraph on page 2 of the specification.

Claim 19 stands objected to based upon the Examiner's conclusion that claim 19 "contains the same limitations as seen in claim 1". The Examiner has

misconstrued the subject matter of claim 19. Claim 1 recites a balanced antenna wherein claim 19 recites a portable communications device including a balanced antenna according to claim 1. In other words, claim 1 is a subcombination defining a balanced antenna and claim 19 is a combination of the balanced antenna of claim 1 in a portable communications device.

Claims 1, 6, 8, 16, 17 and 18 stand rejected as being indefinite regarding the Examiner's contention that "it was not understood how a plane could be 'substantially (or generally) parallel' as by definition planes extend out infinitely in all directions (and thus a plane is either parallel or not)". The independent claims have been amended to recite the first antenna element has a face lying in a first antenna plane and the second antenna element has a face lying in the second antenna plane with the faces being substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and second antenna planes. This recitation is supported by the specification as filed and illustrated in Figs. 4, 5, 10, 12, and 13. Accordingly, reconsideration of the rejection of claims 1, 6, 8, 16, 17, and 18 as being indefinite is respectfully requested.

Claims 1-4, 7-10, 12-15 and 19 stand rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 5,614,863 (Pierro et al) in view of United States Patent 6,549,169 (Matsuyoshi et al) in view of WO 98/44588 (Nghiem). These grounds of rejection are traversed for the following reasons.

Claim 1 recites:

A balanced antenna for connecting to a balanced power amplifier stage in a portable communications device, the balanced power amplifier stage including first and second outputs, the antenna comprising a ground plane and first and second antenna elements spaced apart from the ground plane, wherein the first antenna element has a face lying in a first antenna plane and a

second antenna element has a face lying in a second antenna plane, the faces are substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and second antenna planes, and wherein each of the antenna elements has a feed point connectable to a different output from the power amplifier stage.

If the proposed combination of Pierro et al, Matsuyoshi et al and Nghiem were made, the subject matter of claim 1 would not be achieved.

The Examiner has cited Pierro et al for teaching a balanced power amplifier state, including first and second outputs, with the antenna elements having a feed point connected to one of the outputs of the power amplifier state as illustrated in Fig. 2.

The Examiner acknowledges the following deficiencies with respect to Pierro et al:

Pierro does not specifically teach of in a portable communications device or the antenna comprising a ground plane and first and second antenna elements spaced apart from the ground plane, wherein the first antenna element lies in a first antenna plane and a second antenna element lies in a second antenna plane and the first and second antenna planes are substantially parallel and spaced apart from each other.

Matsuyoshi et al has been cited as teaching a portable communications device and an antenna element comprising a ground plane and first and second antenna elements spaced apart from each other and from the ground plane. However, Matsuyoshi et al do not teach the spatial relationship of the first and second antenna elements recited in claim 1 "wherein the first antenna element has a face lying in a first antenna plane and the second antenna element has a face lying in a second antenna plane, the faces are substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and

second antenna planes". As may be seen, Matsuyoshi et al's antenna elements are disposed generally in a same plane with edges facing each other, such as illustrated in Fig. 5. As such, the faces of the first and second antenna planes of Matsuyoshi et al are not spaced apart from each other in a direction perpendicular to one of the first and second antenna planes since the direction perpendicular to one of the first and second antenna planes of Matsuyoshi et al is perpendicular to the ground plane with the antenna elements such as 111 and 112 illustrated in Fig. 5 not being spaced apart in a direction perpendicular to the ground plane and the planes containing the elements 111 and 112.

Accordingly, if the proposed combination of Pierro et al in view of Matsuyoshi et al were made, the aforementioned spatial relationship of a balanced antenna connected to a balanced power amplifier stage in a portable communications device with the balanced power amplifier stage including first and second outputs coupled to different feed points of the antenna elements and the antenna comprising a ground plane and first and second antenna elements spaced from the ground plane as recited in claim 1 would not be achieved.

Nghiem has been cited as teaching a first antenna element lying in a first antenna plane and a second antenna element lying in a second antenna plane and the first and second antenna elements are substantially parallel and spaced apart from each other. In the first place, as may be seen from the drawings of Nghiem, the antenna elements are not spaced apart from each other in a direction perpendicular to one of the first and second antenna planes. As may be seen, the top portion of conductive plates 202 and 204 lie within a plane spaced parallel to and upward from the ground plane 206. Furthermore, the portions of

the conductive ground planes 202 and 204 which extend down to the ground plane are also disposed in a single plane and therefore, the relationship as recited in claim 1 would not be achieved.

Moreover, claim 1 recites that "each of the antenna elements has a feed point connectable to a different output from the power amplifier stage." Nghiem teaches away from this structure by specifically teaching a single feed 208. See page 3, lines 31-38, page 7, lines 1-7, and page 8, lines 38-39, through page 9, lines 1-7. Therefore, a person of ordinary skill in the art would not choose Nghiem to modify the teachings of Pierro's use of each of the antenna elements having a different feed point connectable to one of the outputs of the power stage amplifier.

Moreover, it is submitted that the Examiner is engaging in impermissible hindsight by picking and choosing from various features of the prior art to make the proposed combination. There is not basis in the record why a person of ordinary skill in the art would be motivated to combine the teachings of Pierro et al, Matsuyoshi et al and Nghiem in the way suggested by the Examiner except by impermissible hindsight.

Claim 2 further limits claim 1 in reciting a balanced antenna wherein the antenna elements are substantially identical, each of the antenna elements having an orientation direction, defined from the feed point to an end opposite the feed point, and the orientation directions of the first and second antenna elements are reversed with respect to one another. The Examiner relies upon Matsuyoshi et al as shown in Figs. 5 and 7 for the aforementioned relationship. It is submitted that Matsuyoshi et al do not teach claimed orientation directions. If

the Examiner persists in the rejection of claim 2, it is requested that he explain on the record how the claimed orientation direction is met. Moreover, the deficiencies noted above with respect to Matsuyoshi et al with respect to claim 1 would prevent the proposed combination from achieving the subject matter of claim 2.

Claim 3 further limits claim 1 in reciting that the feed points of the antenna elements are arranged at opposite sides of the antenna element with the Examiner referring to column 14, lines 26-36, in Fig. 14 of Matsuyoshi et al. It is submitted that this subject matter does not meet the limitations of claim 3 in that Matsuyoshi et al teaches with respect to Fig. 14 that the feed points of the antenna elements are arranged at the same sides of the antenna arrangement whereas illustrated, for example, in Fig. 4 of the present application, they are disposed at opposite sides.

Claim 4 is patentable for the same reasons set forth above with respect to claim 1.

Claim 7 is patentable for the same reasons set forth above with respect to claim 1.

Claims 8-10 are patentable for the same reasons set forth above with respect to claim 1.

Claim 12 further limits claim 1 in reciting a floating ground between the ground plane and the antenna elements. The Examiner asserts that Matsuyoshi et al teach a floating ground between the ground plane and the antenna elements with citation being to column 4, lines 16-26. It is not understood from a review of Matsuyoshi et al how column 4, lines 16-26, disclose

a floating ground. In this regard, the Examiner is referred to paragraph [0043] which describes an example of floating ground 27 with respect to the present invention.

Claim 13 further limits claim 12 in reciting the floating ground comprises a conductive plate which is electrically isolated from the ground plane. Claim 13 is patentable for the same reasons set forth above with respect to claim 12.

Claim 14 further limits claim 13 in reciting that the conductive plate is spaced apart from the ground plane by a dielectric support. The Examiner further relies upon Nghiem at page 6, lines 14-33. It is submitted that this portion of Nghiem does not teach a person of ordinary skill in the art the combination of the conductive plate being spaced apart from the ground plane by a dielectric support when the conductive plate is isolated from the ground plane and is a floating ground. If the Examiner persists in the stated grounds of rejection, it is requested that he point out where this subject matter is taught in Matsuyoshi et al.

Claim 15 is patentable for the same reasons set forth with respect to claim 1.

Claim 19 is patentable for the same reasons set forth above with respect to claim 1.

Claim 5 stands rejected under 35 U.S.C. §103 as being unpatentable over Pierro et al, Matsuyoshi et al, Nghiem and further in view of United States Patent 6,424,300 (Sanford et al). This ground of rejection is traversed for the following reasons.

Claim 5 further limits claim 1 in reciting that the portable communications device includes a printed circuit board and the ground plane comprises the

printed circuit board. Sanford has been cited as disclosing a portable communications device including a printed circuit board and a ground plane comprising the printed circuit board. The citation of Sanford et al does not cure the deficiencies noted above with respect to the rejection of claim 1.

Claim 6 stands rejected under 35 U.S.C. §103 as being unpatentable over Pierro et al in view of Matsuyoshi et al and Nghiem further in view of United States Patent 6,492,952 (Hu et al). Claim 6 further limits claim 1 in reciting that the faces are substantially perpendicular to the ground plane. Hu's teachings of a second antenna element essentially strip shaped and positioned essentially perpendicular to the ground plane 22 would not motivate a person of ordinary skill in the art to cure the deficiencies noted above with respect to the rejection of claim 1.

Claim 11 stands rejected under 35 U.S.C. §103 as being obvious over Pierro et al in view of Matsuyoshi et al and Nghiem further in view of United States Patent 6,288,682 (Thiel et al). Claim 11 further limits claim 10 in reciting that the dielectric constant is greater than about 8. Claim 11 is patentable for the same reasons set forth above with respect to claim 10.

Claim 16 stands rejected under 35 U.S.C. §103 as being unpatentable over Matsuyoshi et al in view of Sanford and Nghiem. This ground of rejection is traversed for the following reasons.

Claim 16 recites:

A portable communications device comprising a circuit board including a plurality of electronic components mounted thereon and a balanced antenna, the balanced antenna comprising first and second antenna elements mounted to the board, wherein the first antenna element has a face lying in a first antenna plane and the second antenna element has a face lying in a second antenna plane

and the faces are substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and second antenna planes, each of the antenna elements having a top edge and a bottom edge, the bottom edge being nearer the board than the top edge, the device further comprising a ground plane disposed between the bottom edge of the antenna elements and the board, the ground plane being electrically isolated from the antenna elements and the board, and each of the antenna elements having a different feed point.

The deficiencies of Matsuyoshi et al have been discussed above with respect to claim 1 and specifically, Matsuyoshi et al do not disclose a balanced antenna comprising first and second elements mounted to the board, wherein the first antenna element has a face lying in a first antenna plane and the second antenna element has a face lying in a second antenna plane and the faces are substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and second antenna planes, each of the antenna elements having a top edge and a bottom edge, the bottom edge being nearer the board than the top edge, the device further comprising a ground plane disposed between the bottom edge of the antenna elements and the board, the ground plane being electrically isolated from the antenna elements and the board, and each of the antenna elements having a different feed point.

Sanford has been cited as teaching a circuit board having a plurality of electronic components mounted thereon. The teachings of Sanford do not cure the deficiencies noted above with respect to Matsuyoshi et al with respect to the balanced antenna comprising first and second antenna elements as recited in claim 16.

Further Nghiem has been cited as teaching a first antenna element lying in a first antenna plane and a second antenna element lying in the second plane.

The deficiencies of Nghiem have been pointed out above in claim 1 with respect to the recitation of the balanced antenna recited in claim 16.

It is submitted that a person of ordinary skill in the art would not achieve the claimed subject matter if the proposed combination of Matsuyoshi et al, Sanford and Nghiem were made for the reasons set forth above. Moreover, it is submitted that the rejection is based upon impermissible hindsight with the Examiner picking and choosing from the prior art to find different elements to make a combination rejection which a person of ordinary skill in the art would not consider making without the benefit of the applicant's specification.

Claim 17 stands rejected under 35 U.S.C. §103 as being unpatentable over Matsuyoshi et al in view of Nghiem. This ground of rejection is traversed for the following reasons.

Claim 17 recites:

A balanced antenna for a portable communications device, comprising a ground plane and first and second substantially similar antenna elements spaced apart from each other and from the ground plane, the first antenna element having a face lying in a first antenna plane and the second antenna element having a face lying in a second antenna plane, wherein the faces and the ground plane are substantially parallel and spaced apart from each other in a direction perpendicular to one of the first and second antenna planes, the first and second antenna elements are aligned in opposite directions with respect to one another and each of the antenna elements has a different feed point.

Claim 17 recites the same relationship of the first and second antenna elements as recited in claims 1 and 16. The proposed combination of Matsuyoshi et al and Nghiem is deficient in teaching this subject matter for the reasons set forth above.

Claim 18 stands rejected under 35 U.S.C. §103 as being unpatentable over Pierro et al in view of Matsuyoshi et al in view of United States Patent 6,130,651 (Yanagisawa et al). This ground of rejection is traversed for the following reasons.

Claim 18 recites:

A method of manufacturing a balanced antenna for connecting to a balanced power amplifier stage in a portable communications device, the balanced power amplifier stage including first and second outputs, the antenna comprising a ground plane and first and second antenna elements, the first antenna element having a face lying in a first antenna plane and the second antenna element having a face lying in a second antenna plane, wherein the faces are spaced apart from each other in a direction perpendicular to one of the first and second antenna planes and from the ground plane, wherein the antenna elements are arranged to be opposite one another and to overlap to a predetermined extent, and each of the antenna elements has a feed point connectable to a different output from the balanced power amplifier stage, the method comprising varying the extent to which the antenna elements overlap to tune the antenna for use in a predetermined frequency band.

The deficiencies of the rejection over Pierro et al in combination with Matsuyoshi et al have been discussed above with respect to the rejection of claim 1. Claim 18 recites the same spatial relationship of the first and second antenna elements as recited in claims 1, 16 and 17.

Yanagisawa et al have been recited as teaching an overlap to a predetermined extent for varying the extent to which the antenna elements overlap to tune the antenna. However, the teachings of Yanagisawa et al do not cure the deficiencies noted above with respect to the combination of Pierro et al and Matsuyoshi et al.

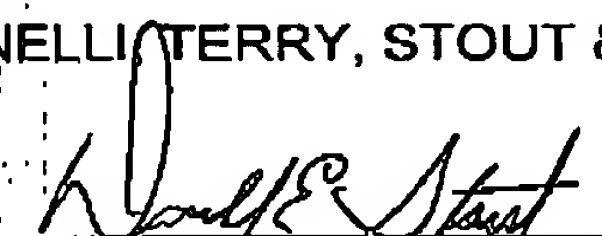
It is submitted that the proposed combination would not yield the claimed subject matter of claim 18 in that none of the art teaches the first and second antenna elements as recited in claim 18. Moreover, it is submitted that there is no basis in the record why a person of ordinary skill in the art would be led to modify the teachings of the cited prior art to arrive at the claimed subject matter except by impermissible hindsight. The Examiner again is picking and choosing various elements in the prior art without sufficient motivation being demonstrated in the record that a person of ordinary skill in the art would be motivated to combine the references to achieve the subject matter of claim 18.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (1076.39608X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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